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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/812,157	03/19/2001	Eugene P. Marsh	150.00930102	2941

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EXAMINER

MALDONADO, JULIO J

ART UNIT PAPER NUMBER

2823

DATE MAILED: 06/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/812,157

Applicant(s)

MARSH, EUGENE P.

Examiner

Julio J. Maldonado

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 58-106 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 58-106 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. The final rejection as set forth in paper No.6 is withdrawn in response to applicants' response.
2. A new 103(a) rejection is made as set forth in this Office Action.
3. Applicants' addition of claim 106 is acknowledged.
4. Claims 58-106 are pending in the application.

Continued Examination Under 37 CFR 1.114

5. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/20/2003 has been entered.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting

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directly or indirectly from an international application filed before November 29, 2000.

→ Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claims 58, 61-66, 69-73, 83, 88-92, 96-100, 101, 102 and 105 are rejected under 35 U.S.C. 102(3) as being anticipated by Summerfelt (U.S. 6,117,689).

→ In reference to claims 58, 66, 83, 93, 101, 102 and 105, Summerfelt (Figs.7-13b) in a related method for patterning platinum layer teach the steps of providing a substrate assembly (34) including a surface; forming a patterned metal-containing adhesion layer (64) on the surface, resulting in at least one exposed surface region of the substrate assembly (34); forming a platinum layer (84) on the patterned metal-containing adhesion layer (64) and the at least one exposed surface region of the substrate assembly (34); annealing the substrate assembly (34) including the patterned metal-containing adhesion layer (64) and the platinum (84) thereon, causing pooling of the platinum (70) on the at least one exposed surface region of the substrate assembly (34); and removing at least a portion of the platinum (72) from the at least one exposed surface region of the substrate assembly (34) resulting in a patterned platinum layer (70) (column 6, line 19 – column 10, line 13).

In reference to claims 61-65, 69-73, 88-92 and 96-100, Summerfelt teaches wherein annealing the substrate assembly comprises annealing the substrate assembly at a temperature less than the melting point of the at least one exposed surface region in an atmosphere of at least nitrogen (column 8, lines 34 – 35); wherein the patterned metal-containing adhesion layer comprises titanium nitride (column 7, line 65 – column

8, line 2); and wherein the at least one exposed surface region comprises silicon dioxide (column 7, lines 45 – 49).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 59, 60, 67, 68 and 74-80, 85-87, 94, 95 and 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Summerfelt ('689).

In reference to claims 59, 60, 67, 68, 74, 85, 86, 94, 95 and 103, Summerfelt (Figs.7-13b) in a related method for patterning platinum layer teach the steps of providing a substrate assembly (34) including a surface; forming a patterned metal-containing adhesion layer (64) on the surface, resulting in at least one exposed surface region of the substrate assembly (34); forming a platinum layer (84) on the patterned metal-containing adhesion layer (64) and the at least one exposed surface region of the substrate assembly (34), wherein said platinum layer (84) has a thickness of 30Å (column 8, lines 25 – 40); annealing the substrate assembly (34) including the patterned metal-containing adhesion layer (64) and the platinum (84) thereon, causing pooling of the platinum (70) on the at least one exposed surface region of the substrate assembly (34) wherein said annealing is performed at a temperature of 500°C; and removing at least a portion of the platinum (72) from the at least one exposed surface region of the

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substrate assembly (34) resulting in a patterned platinum layer (70) (column 6, line 19 – column 10, line 13).

Summerfelt fail to teach forming the platinum layer having a thickness in the range of about 500Å or less; and performing the annealing step at a temperature in the range of about 1,100°C or less. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to appreciate that the ranges of Summerfelt overlap the ranges of the claimed invention. Given that both, Summerfelt and the claimed invention are directed to analogous art to the formation of platinum electrodes, the same results would be obtained and a *prima facie* case of obviousness exists. See MPEP 2131.03 and 2144.05.

Not
obvious,
disclosed.

In reference to claims 75 and 87, Summerfelt teach increasing the temperature range in order to control the platinum nucleation density (column 8, lines 41 – 52), but fails to teach the annealing temperature is between about 650°C and 1,100°C. However, the selection of the claimed range is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above-mentioned temperature range in Summerfelt to arrive at the claimed invention.

In reference to claims 76-80, Summerfelt teaches wherein annealing the substrate assembly comprises annealing the substrate assembly at a temperature less than the melting point of the at least one exposed surface region in an atmosphere of at least nitrogen (column 8, lines 34 – 35); wherein the patterned metal-containing

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adhesion layer comprises titanium nitride (column 7, line 65 – column 8, line 2); and wherein the at least one exposed surface region comprises silicon dioxide (column 7, lines 45 – 49).

10. Claims 81, 82 and 106 are rejected under 35 U.S.C. 103(a) as being unpatentable over Summerfelt ('689) as applied to claims 59, 60, 67, 68 and 74-80 above, and further in view of Ghandhi (VLSI Fabrication Principles).

Summerfelt (Figs.7-13b) in a related method for patterning platinum layer teach the steps of providing a substrate assembly (34) including a surface; forming a patterned metal-containing adhesion layer (64) on the surface, resulting in at least one exposed surface region of the substrate assembly (34); forming a platinum layer (84) on the patterned metal-containing adhesion layer (64) and the at least one exposed surface region of the substrate assembly (34); annealing the substrate assembly (34) including the patterned metal-containing adhesion layer (64) and the platinum (84) thereon, causing pooling of the platinum (70) on the at least one exposed surface region of the substrate assembly (34); and removing unadhered platinum (72) from the at least one exposed surface region of the substrate assembly (34) resulting in a patterned platinum layer (70) (column 6, line 19 – column 10, line 13).

Summerfelt fails to teach removing pools of unadhered platinum from the surface region by rinsing the substrate assembly in a rinsing composition for a period of time of about 5 minutes or less, wherein the rinsing composition comprises at least one composition selected from the group consisting of water, aqua regia, hydrofluoric acid, hydrochloric acid, hydrogen peroxide, and combinations thereof. However, Ghandhi in

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a related cleaning process teaches rinsing the substrate assembly in a rinsing composition to remove heavy metals from the surface of a substrate, wherein the rinsing composition comprises at least one composition selected from the group consisting of water, aqua regia, hydrofluoric acid, hydrochloric acid, hydrogen peroxide, and combinations thereof (pages 517 – 518). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the cleaning operation of Ghandhi to remove residues of platinum in the deposition process of Summerfelt, since cleaning of wafers must be done each processing step in the fabrication sequence (page 518).

The combined teachings of Summerfelt and Ghandhi fail to teach said removing step for a period of time of about 5 minutes or less. However, the selection of the claimed range is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. Therefore, one of ordinary skill in the art at the time the invention was made would have been led to use the above-mentioned range to arrive at the claimed invention.

11. Claim 84 and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Summerfelt ('689) as applied to claims 58, 61-66, 69-73, 83, 88-92, 96-100, 101, 102 and 105 above, and further in view of Nishioka et al. (U.S. 5,489,548).

Summerfelt teaches wherein the substrate assembly includes an opening defined therein, wherein the opening is defined by a bottom surface of the substrate assembly and at least one side wall surface extending therefrom. Summerfelt fails to teach wherein the discontinuous metal-containing adhesion layer is formed on the surfaces

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defining the opening; and forming the platinum layer using chemical vapor deposition. However, Nishioka et al. (Fig.13) in a related method to form a platinum electrode for a DRAM device teach a substrate assembly (30, 32) including an opening therein, wherein the opening is defined by a bottom surface of the substrate assembly and at least one side wall surface extending therefrom; depositing a discontinuous metal-containing adhesion layer (36) on the opening, wherein the discontinuous metal-containing adhesion layer (36) is formed in the surface defining the opening (column 7, lines 12 – 30); and depositing platinum (42) over the discontinuous metal-containing adhesion layer (36) using chemical vapor deposition (column 5, lines 58 – 65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Nishioka et al. and Summerfelt to enable the adhesion layer and the platinum layer to be formed as taught by Nishioka et al.

Response to Arguments

12. Applicant's arguments filed 04/03/2003 have been fully considered but they are not persuasive.

Applicants argue, "...Summerfelt... does not suggest a deposition technique wherein the binding energy of the material deposited is much greater to itself than to the surface wherein the binding energy of the material deposited is much greater to itself than to the surface to which it is deposited so that 'island of the deposited material form...". In response to this argument, Summerfelt teaches depositing a platinum layer

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over a surface. After the deposition step, Summerfelt performs an annealing step forcing the growth of one grain (i.e., one single crystal) of platinum (column 6, line 19 – column 10, line 13). To perform such step, it is required that the platinum atoms prefer to form bonds between themselves than to the surface to which they are deposited. In other words, the binding energy that keep the platinum atoms in a single crystal has greater than the binding energy of the surface to which is deposited, so that one single grain (or one single island), of platinum is formed. Therefore, Summerfelt does teach the pooling process as argued.

Conclusion

13. Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

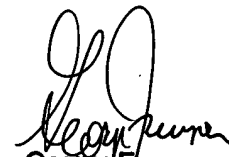
Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

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Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.



JMR
6/6/03



George Fourson
Primary Examiner